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THE PINE SNAKE IN VIRGINIA.

Records for the Pine Snake, *Pituophis melanoleucas* (Daudin), outside of Florida and New Jersey are few and far between. In fact the only ones I have been able to find are the one in Brimley's North Carolina list from Swain Co., N. C., and a specimen in the National Museum from Blount Co., Tenn. Both of these localities are in the Big Smoky Mountains.

It is of interest then that a dead specimen about 3′ 6″ long was found on August 19, on the road across the "Spur" between Nimrod Hall and Milboro Springs, in Bath Co., Va.

This locality is in the Alleghany Mountains and the altitude is about 1,000 feet. The road at this point was bordered on each side by a rather steep slope covered with laurel and rhododendron.

This snake is fairly well known in Virginia as the "bull snake." It does not seem to occur outside of the mountains as all of the many stories of this snake, reputed to reach a length of twelve feet, have their scene in the western tier of counties.

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Ratio of Length, Girth and Weight in the Perch.

The accompanying table shows the length, girth and weight ounces of 79 perch (*Perca flavascens*), caught in Stony Creek Pond, Coreys, Franklin Co., N. Y., August, 1917. The table indicates that the

Length	Girth	Weight oz.	Length	Girth	Weight oz.
11 1/8	7 1/8	12	8 5/8	5 1/4	4 3/4
9 3/4	6	7 1/2+	8 3/4	5 1/4	4 3/4
9 3/4	6 1/8	7 1/2	8 5/8	5 3/8	5
9 1/2	6	6 3/4	8 3/4	5 1/4	4 3/4
9 1/2	5 7/8	6	8 3/4	5 1/4	4 3/4
9 1/4	5 3/8	5 3/4	8 5/8	5 3/8	5
9 1/4	6 1/8	6 1/2	8 1/2	5	4 1/2
9 1/4	5 7/8	6 1/4	8 1/2	4 3/8	3
9 1/4	5 1/2	5 1/2	8 1/2	5	4
9 1/8	5 3/4	5 3/4	8 5/8	5	4
9 1/8	5 3/8	5	8 1/4	4 7/8	4 1/4
9 1/8	5 3/4	5 1/2	8 1/4	5	4
8 7/8	5 1/2	5 3/4	8 1/4	5 1/4	4
8 7/8	5 1/4	5	8 1/8	4 7/8	3 3/4
8 3/4	5 1/4	4 3/4	8 1/8	4 3/4	3 1/2
8 5/8	5 3/8	5	8 1/8	4 5/8	3 1/4
8 1/2	5	4 1/2	8 1/8	5	4
8 1/2	5	4	8 1/8	4 3/4	3 1/2
8 1/2	4 3/8	3	8	5	3 3/4
8 7/8	5 1/2	5 3/4	8	4 3/4	3 3/4
8 7/8	5 1/4	5	8	4 5/8	3 1/4

variation in weight of perch of the same length is never more than one ounce. Also a rough approximation of the weight ounces may be obtained in this species by multiplying the girth squared by the length inches and dividing by 50.

C. W. MEAD,
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Length	Girth	Weight	Length	Girth	Weight
8	5 3/8	4 1/4	5 3/4	3 1/2	1 1/4
8	4 5/8	3 1/4	5 3/8	2 7/8	3/4
7 7/8	5	3 1/2+	5 1/4	2 7/8	3/4
7 5/8	4 3/4	3 1/4	5 1/8	2 3/4	3/4
7 1/2	4 1/4	2 3/4	5 1/8	2 7/8	3/4
7 3/8	4 5/8	3	5	2 3/4	3/4
7 1/4	3 7/8	2 1/4+	5	2 7/8	3/4
7 1/8	4 3/8	2 1/2	4 5/8	2 5/8	1/2
7	4 1/8	2 1/2	4 5/8	3	1/2+
6 7/8	3 7/8	2	4 1/2	2 5/8	1/2+
6 5/8	4	2	4 3/8	2 1/2	1/2
6 1/2	3 3/4	2	4 3/8	2 1/4	1/2
6 3/8	3 5/8	1 3/4	4 1/8	2 5/16	1/2
6 1/4	3 1/4	1 1/4	4	2 3/8	1/2
6 1/4	3 5/16	1 1/2+	4	2 1/4	1/2
6 1/8	3 1/2	1 1/2	3 5/8	2 1/16	1/3
6	3 3/8	1 1/2			
6	3 3/8	1 1/2			
6	3 1/2	1 1/2			
5 7/8	3 1/4	1 1/4			
5 7/8	3 1/4	1 1/4			

LEAPING OF A HEMIRAMPHID.

The synentognathous fishes comprise various elongated marine forms, and the remarkable flying fishes which make long excursions through the air supported by their greatly enlarged pectoral fins. It is interesting that the habit of leaping in the air is common throughout the group and therefore, may reasonably be supposed to have been possessed by the ancestors of the flying fishes before the fin development which has made it pre-eminent among these.* Or in other words, habit has preceded correlated structure in this case. The half-beaks are the modern synentognathi which apparently approach most closely to the ancestors of the flying fish.

On April 1, off Sandy Key near Cape Sable, Florida, there was an unusually favorable opportunity for the writer to watch the leap of a half-beak and a short quotation from his field notes of that date seems worth recording: "A Half-beak (probably *Hemiramphus*) of perhaps 9 in., skipped over the surface down wind with great speed. Initially it may have been more or less on its side, but towards the end of the leap (which probably exceeded 30 yards) it was right side up, its little anterior pectorals extended at right angles, and it appeared to maintain its impetus by skulling with the tail at intervals as it touched the surface." A surprisingly flying-fish-like performance.

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* See Copeia, 1915, No. 19, p. 12-13.

THE JUMPING ABILITY OF PLETHODON AND ITS POSSIBLE BEARING UPON THE ORIGIN OF SALTATION IN THE ANCESTORS OF THE ANURA.

On the evening of August 18, 1917, at Snowville, N. H., I picked up a gray-backed *Plethodon cinereus* 71 mm. in total length. It was caught crossing a sandy road just before dusk. While I held it on one open hand, it surprised me by *jumping* to the sleeve of my other arm. I experimented further by holding my open right hand at varying distances from the salamander on the left hand. In its efforts to escape, the creature always scurried straight ahead, in the direction in which it had been pointed, and when it reached the edge of my palm, it leaped across the open space to the other hand, repeatedly clearing a distance of fully twice its length. In this manner I kept it jumping rapidly for perhaps two dozen times before it became sufficiently fatigued to quiet down.

The fact that this salamander is a leaper may possibly be known, but I had never before observed it. I had always considered the terrestrial urodeles as exclusively creeping animals, probably because I had hitherto found them chiefly in the daytime, during their inactive hours. This *Plethodon* was just starting out on its nocturnal wanderings, and was no doubt at its liveliest. I now understand how members of the species cross deep ruts in roads, and how they surmount such obstacles as logs and fallen boughs in the boggy woods that they inhabit. The discovery also throws light on the way that they capture Bibionid flies, winged ants, Collembola, and other active insects, remains of which I have found in the stomachs of *Plethodon cinereus*, taken under dead logs in the early morning. I had often wondered how a sluggish salamander—a lowly creature which I had supposed to move like a stranded mudpuppy—could feed upon flying or jumping insects.

I now infer that it lies in wait and leaps at its prey like a cat at a sparrow.

When I look at the diminutive legs of this salamander—legs hardly thicker than a pin, and devoid of modernized, condylarthrous joints—I marvel that they should be able to propel the squat, snaky body for a distance of twice its length through the air. It seems mechanically incredible, even though the saltatory impulse doubtless come more from the myocommata rather than from the minute muscles of the limbs.

With all of this in mind, why could not some of the temnospondylous Stegocephalians, such as the Permian *Cacops,* or *Dissorophus,* or the African Triassic *Brachyops,* have begun the jumping habit? And may not the ancestors of the frogs and toads have been excellent leapers even before they lost their loose-hung bodies and permanent tails? None of them, surely, had less of a "jumping build" than *Plethodon.* Furthermore, if the direct, as well as the collateral ancestors of the Anura were large creatures, it is easy to believe that decrease in size and weight would be a necessary concomitant to improved saltatory power during the tailed epoch. *Plethodon* approximates a crocodilian in build; if it were as large and heavy it probably could not jump.

All kown Anura, even as far back as the Jurassic, are extremely modernized, and are separated by a wide evolutionary gap from the Palaeozoic amphibians. My intention is merely to suggest that such a form as *Cacops* may well have been a leaper; and to draw an analogy between the modern urodeles, in which the saltatory habit is doubtless an incipient land-living development, and the primitive temnospondyls, which, as recently suggested,[1] may possibly be the forbears of the leaping frogs and toads.

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[1] Gregory, W. K., *The American Naturalist,* Vol. 51, 1917, p. 317.

NOTES ON THE BREEDING OF THE AMERICAN TOAD.

I had the opportunity on June 5, 1917, to observe the breeding of the American Toad. The place was a small artificial pool, about four by six feet. A steady rain fell throughout the evening. Mr. Richard G. Turner and I first approached the singing male at 9:00 P. M. It was quite dark at the time. At first we could not advance towards the toad within thirty feet without the trill's instantly ceasing. We used the most stealthy manner of approach. Then we tried hiding behind a tree, but the first step would be detected and the trill stopped at once until we withdrew. About ten o'clock we discovered that our steps were not followed by silence, and to our amazement we walked up to the pool and threw on a small electric search light, all the while the trill continuing. The male was sitting on the edge of the pool, the throat membrane fully extended and the trill throbbing in our ears. Five feet away was the large female rapidly hopping towards the male. From this time on, the toads seemed to take no notice of our motions. Indeed, again and again we reached down and touched or tightly held the inflated membrane as the male sang. Even this made no difference to the toad.

The performance that went on was repeated as long as we stayed. It was as follows: When the male began to trill, the effect on the female was instantaneous. Whether she was in the water or on the land, she would make frantic efforts to reach the male. But the second the trill stopped she was all indifference, and often in a few moments would hop off in another direction. But as the trills came every few minutes, she would finally in one of her drives reach the male while he was in the midst of a trill. He would not seem to notice her until she was within an inch of him; then he would scramble on her back,

and sometimes there finish the trill. If on land, the female would at once start for the water. A few moments after reaching the water, the male would lose his hold and be tossed off. Then the performance would start all over again, the male usually climbing first out of the water. He would take absolutely no notice of the female if he was not trilling when she was placed next to him. Thus, the interesting feature was that the trill is the apparent stimulus for both sexes. We left the pool about eleven o'clock, but the trills were heard far into the night.

We did not actually see the operation of spawning, but a little later hundreds of tiny tadpoles were observed in the pool.

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